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SCIENCE

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THE FUTURE OF AGRICULTURAL SCIENCE IN THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE¹

IT is certainly within the recollection of the youngest member of Section O that the attachment of the designation *Agricultural* at once removed the matter under discussion from the scientific field. Agricultural botany, agricultural physics, agricultural chemistry, and the other agriculturals were simply the reflections of the glories of the pure sciences into the dark, unfathomed caves of everyday living. No real botanist would study the corn plant. No real chemist would waste his time on its chemical composition. The physics of the soil was certainly beneath the physicist. Such lights in the darkness as Darwin, Liebig and Pasteur (whose great work was done with domesticated plants and animals, soils and industries agricultural in the broad sense) failed to sensitize the blind spots in the minds of the pure scientists of yesterday. To-day this situation no longer exists, not so much because of any change in the sciences themselves, but more because of the sensitization of the blind spots in the minds of those who devote themselves to scientific study.

This change has come about largely as the result of the work of the agricultural experiment stations. It is true that in the beginning much was done by workers in the stations in the name of science that was not scientific, but that has always been true, even more in the history of so-called pure science than in this period of the beginning of agricultural science. It is generally true to-day. In the beginnings of agricultural science,

¹ Abstract of the address of the vice-president and chairman of Section O, Agriculture, American Association for the Advancement of Science, Chicago, 1920.

speaking generally, the workers of necessity came from the so-called pure science field. While they doubtless lost caste for a time, many of them have lived to see the old opposition die. The best universities in the land are now proud to call these men from the agricultural experiment stations to their highest research positions.

The worker in the land grant college, the experiment station or the National Department of Agriculture, as in other fields, is now accepted on his merits as a research worker. Research in the field of agriculture has, as in the days of Darwin, been so fruitful in results of scientific as well as economic value that it is receiving the attention of such institutions as Harvard, Yale, Columbia, Johns Hopkins and Chicago, as well as of the great state universities, and most recently by the Rockefeller Foundation for Medical Research in its laboratories for animal diseases under the direction of Dr. Theobald Smith, formerly in the Bureau of Animal Industry, of the U. S. Department of Agriculture, and later in the Bussey Institution of Harvard University. This Foundation also contemplates a similar laboratory for phytopathological research.

The latest development in this field is the organization of the Division of Biology and Agriculture of the National Research Council, an agency established by the National Academy of Sciences at the request of the President of the United States, to organize and conduct research in every field necessary during the world war. After the close of the war the President requested that the Council be reorganized for the promotion of research of value to the nation and placed on a permanent basis. This was carried out in a comprehensive way, supplementing existing agencies, governmental and private, without supplanting them; in fact, the National Research Council is now a clearing house of research agencies of the United States, also having relations with similar organizations abroad through an international association. It supplements the work of the American Association for the Advancement of Science,

and through stimulating research in general it will, without doubt, increase the interest of scientific workers in this association, which is the greatest organized scientific forum of the United States. Every live scientific worker in America should join this association through the sections in which he is especially interested. Section O should be the largest and liveliest Section of the Association. We draw from all sciences and are interested in all, including those usually designated as social and economic. We may be members also of special affiliated societies, like the Botanical Society of America, the Society for the Promotion of Agricultural Science, etc., but that is all the greater reason why we should be members of Section O—the agricultural focus of this association.

It has been proposed to merge the famous old Society for the Promotion of Agricultural Science with Section O. I believe that this is a wise move. Possibly the same idea could be carried out with reference to some other societies in relation to other Sections. We need but two types of society organization based on subject matter—one small, select, highly specialized group and one generalized group. There are now too many organizations covering practically the same field. Time and money are not available to keep in touch with all. Let us carefully study the problem and consolidate wherever it can be done to advantage. All of the great research organizations ought to be affiliated with the American Association for the Advancement of Science and hold their meetings at the same place in such way as not to conflict with each other. This has been accomplished in part. It should now be completed.

While much has been accomplished in agricultural investigation in the past we are just entering what may rightly be termed the scientific phase of agricultural development. Research in this field must be greatly intensified. The mere mention of some of the fields such as genetics, plant and animal nutrition, plant and animal disease, disease resistance and immunity, and soil biology will recall to your minds at once the fact that we are just

at the beginning. If we are to feed and clothe the increasing population of the world and still retain some time for culture and recreation we shall need to conduct scientific research in all fields to an extent hitherto unheard of. This is especially true in the fields represented by this section. Unless we succeed in furnishing food and clothing nothing else avails. Except for temporary displacements, due to faulty distribution, population increase has been more rapid than food production. The time is at hand when we should have scientific information regarding disease control, genetics, maintenance of fertility and cultural methods which we do not now possess. It may take years of patient study to get it. We must educate the public to understand the need and provide for it. It is a part of the duty of this association to take part in this educational work. It is the special duty of this section in regard to agricultural science. Let us be a federation of inspiring spirits as well as active workers for its promotion.

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INVESTIGATION OF THE FLORA OF NORTHERN SOUTH AMERICA¹

IN the summer of 1918, after consultation and correspondence by members of the staffs of the New York Botanical Garden, the United States National Museum and the Gray Herbarium of Harvard University, a cooperative investigation of the botany and plant products of northern South America was organized and has since been prosecuted. It is planned to include geographically the Guianas, Venezuela, Colombia, Ecuador, and the adjacent Caribbean islands Trinidad, Tobago, Margarita, Bonaire, Curaçao and Aruba.²

The reasons for the investigation are the deficiency of exact information relative to the vegetation of the region and the paucity of specimens of plants inhabiting it in museums

¹ Read at the Princeton meeting of the National Academy of Sciences.

² See SCIENCE, 48: 156, 157, 1918.

and herbaria of the United States. By far the larger representation of the species is in European institutions. A great number of them have been collected only once, and records of habit and habitat are either altogether lacking or quite inadequate. Owing to the necessity of making comparisons of specimens with the types preserved in the European collections, much of the material which has hitherto found its way into American institutions has remained incompletely determined. While the published literature of the subject is large, it is widely scattered, and there are no complete lists of plants or descriptive floras of any part of the area under investigation; such monographs or lists of species of genera or of families as have been attempted by authors are incomplete and very many species have been erroneously identified. As to plant products, we are as yet uninformed in many cases as to the identity of the species of plants yielding them and whether or not the supply of such products can be increased by the cultivation of the species from which they are derived.

The investigation is making progress in remedying these conditions, through the study of series of specimens recently obtained in Dutch Guiana, British Guiana, Trinidad, Tobago, Venezuela, Curaçao, Colombia and Ecuador, collectively providing specimens representing several thousand species, and further field expeditions are being arranged. The collections when received, are divided among the three cooperating institutions, field agents being instructed to obtain three specimens of each plant collected whenever possible, and also to make record of habit, habitat and color of flowers and fruits and to make other notes which may be of importance. Specimens beyond three in number may be sent to other institutions or to specialists, and the cooperation of many experts has been obtained.

Preliminary studies of the collections already made prove that the investigation is very well worth while. Dr. Francis W. Pennell, of the New York Botanical Garden staff, expert in the Family Scrophulariaceæ, has detected and partly described some 70 species